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Influence of the parameters characterizing the near-fault earthquakes in the seismic response of base isolation structures

Miguel E. Tornello*, Carlos D. Frau†, Daniel Pagano†

*CEREDETEC (Centro Regional de Desarrollos Tecnológicos para la Construcción, Sismología y la Ingeniería Sísmica).
Universidad Tecnológica Nacional Facultad Regional Mendoza.
Rodríguez 273, Ciudad, Mendoza, Argentina (5500)
naguera@frm.utn.edu.ar

ABSTRACT

In the last two decades of earthquake engineering has developed new strategies to control and reduce damage to the buildings upon the occurrence of destructive earthquakes. The seismic base isolation is one of the innovative techniques of seismic protection. As for earthquakes, near-fault, are characterized by highly destructive. Near fault earthquake constructs undergo large deformations and must also dissipate considerable energy in a few cycles and reduced time. The records of near-fault earthquakes are characterized by velocity pulse with long period and large amplitude [1]. The velocity pulses are those that produce the most damage on buildings. The paper evaluates the response of a three story building constructed with masonry and reinforced concrete with two types of seismic isolation devices; the elastomeric isolators with lead core and steel springs - viscous dampers [2]. To evaluate the response of seismic isolated building 90 near-field records were used, the records contain different velocity pulse identified as pulse according to the work of Baker [3]. The components of acceleration records were rotated at the normal and parallel to the trace of the seismogenic fault to obtain the maximum demand direction. Isolation building responses were determined by nonlinear dynamic analysis by elastomeric isolators devices and lineal analysis by springs and viscous dampers device. In both cases, the time history response were evaluated for different periods of the building. The results show that there is no clear correlation between the parameters characterizing earthquakes and the maximum response of the isolation structure. It was also noted that in some cases the maximum response is controlled by the velocity pulse but by sections of the registry that are outside the window of the pulse.

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